



GEM Gas Distribution Prototype Progress

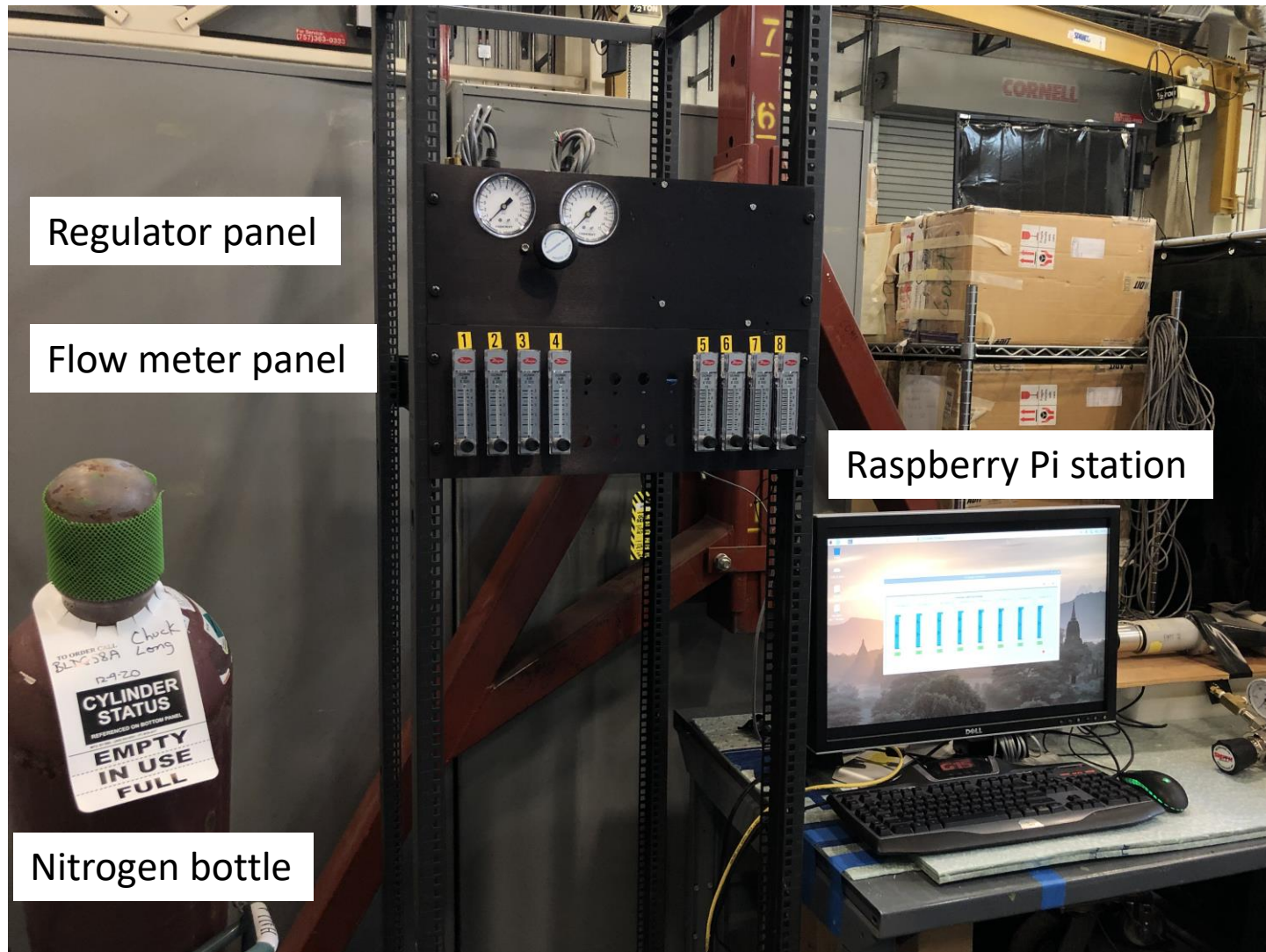
Marc McMullen and the Detector Support Group

02/08/2021

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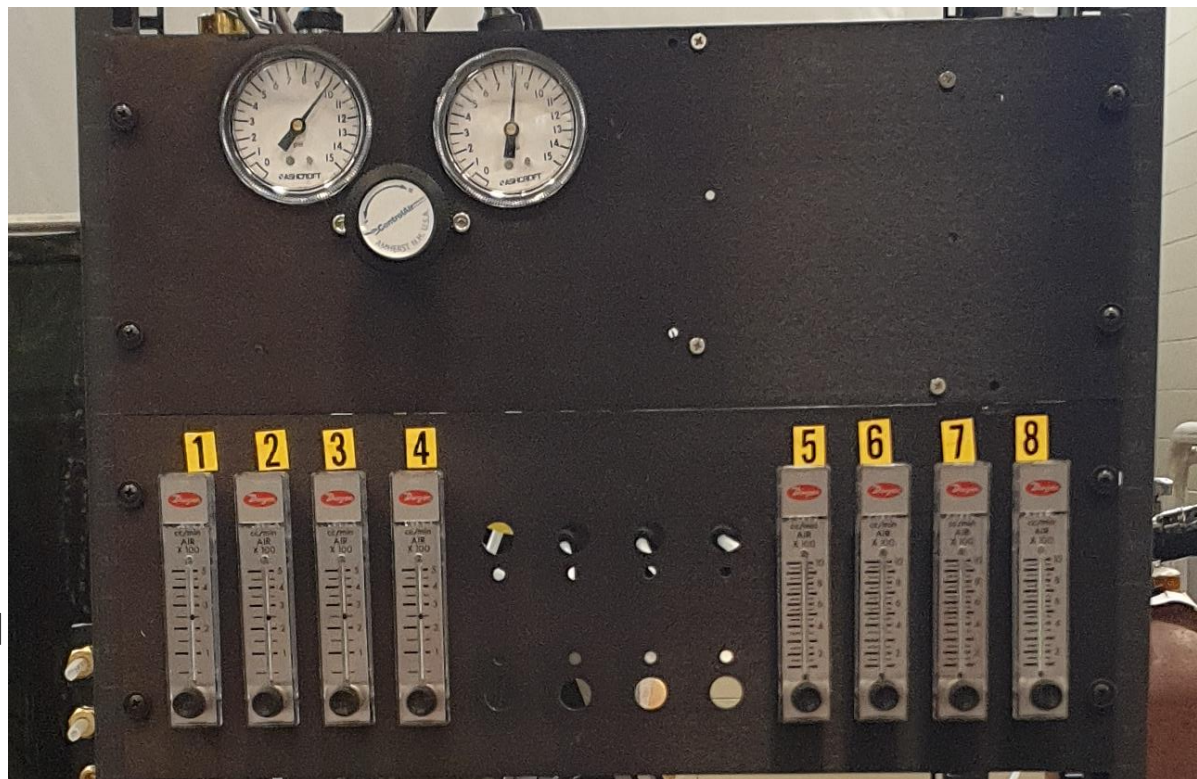
Prototype GEM Gas Distribution System



Rack Front: Regulator and Flow Meter Valve Panels

Pressure gauges
High / Low

Regulator panel

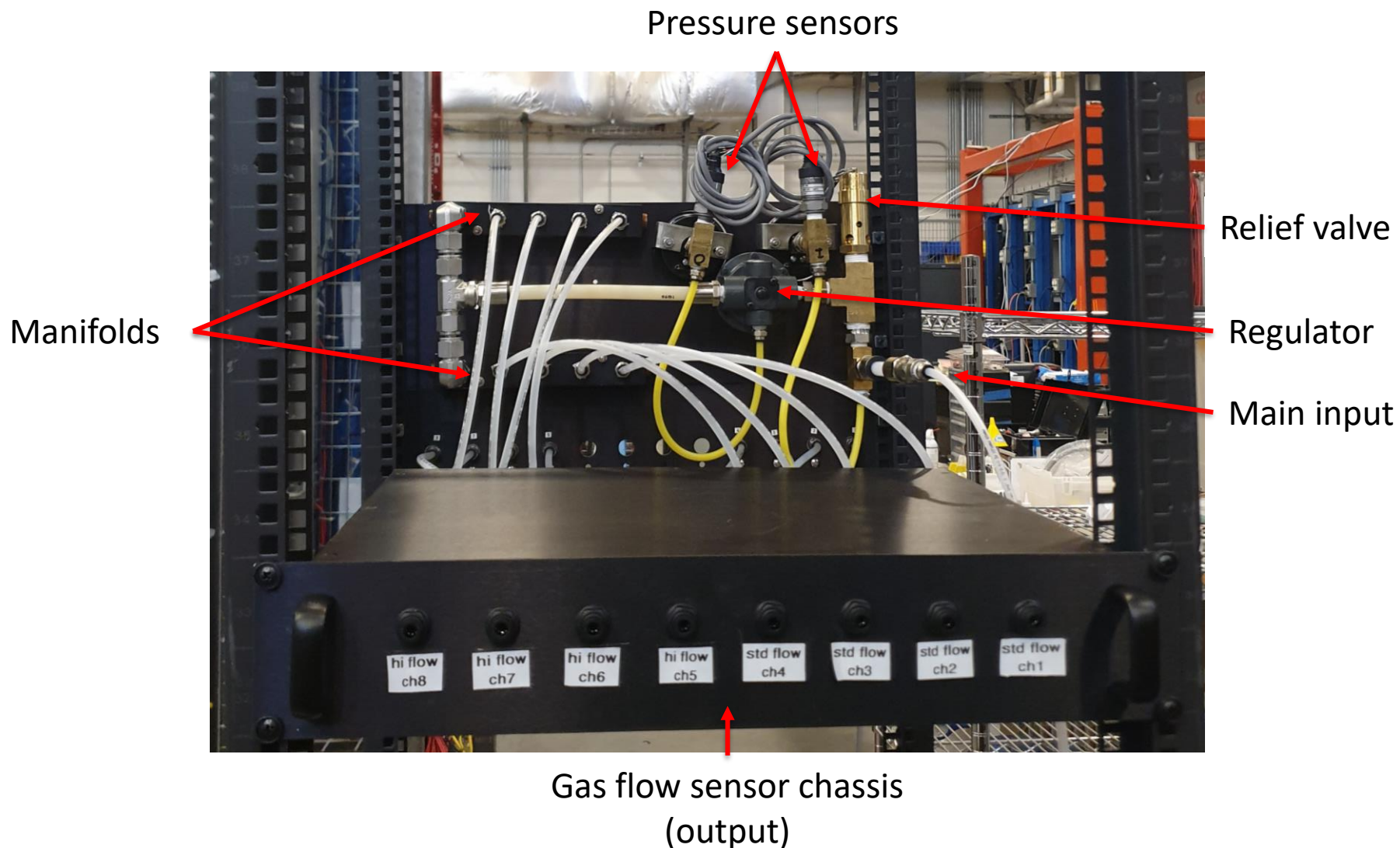


Standard flow
(max 500 sccm)

High flow
(max 1000 sccm)

Flow meter panel

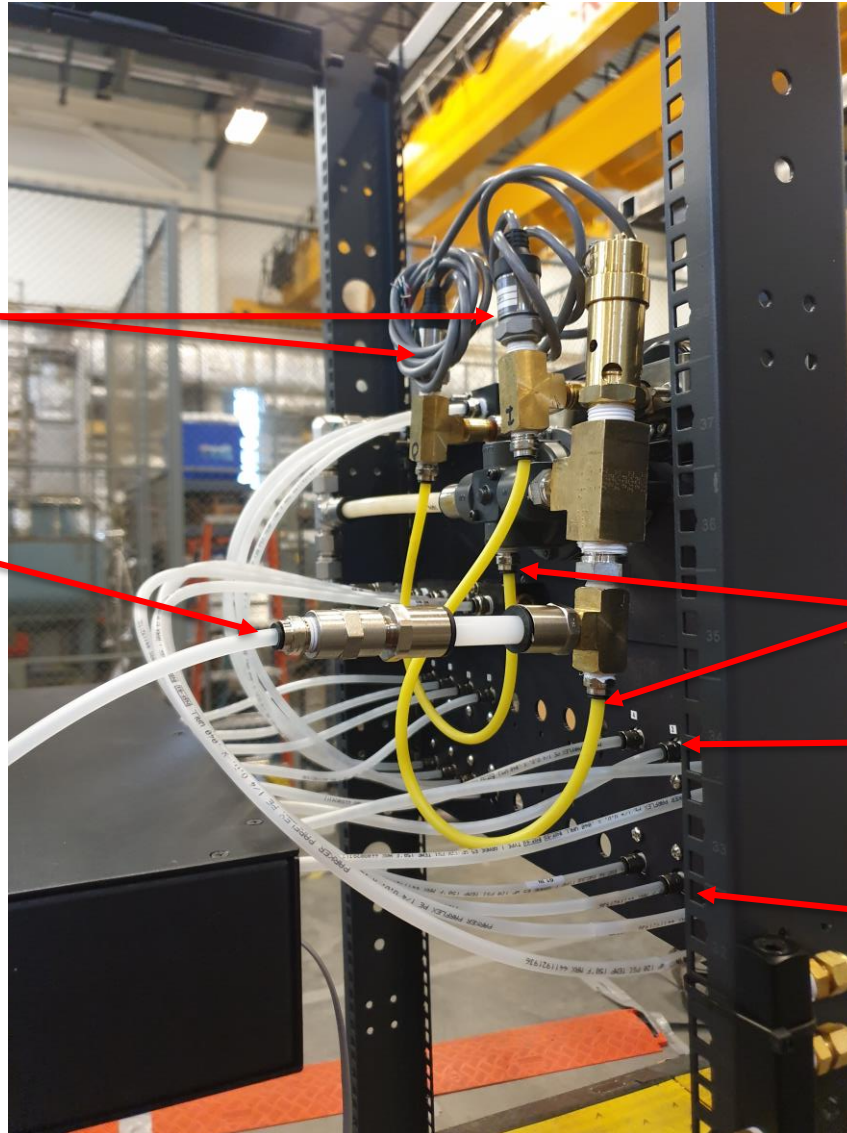
Rack Back: Gas Flow Sensor Chassis with Panel Parts



Rack Gas Line Connections

Pressure sensors

Main input

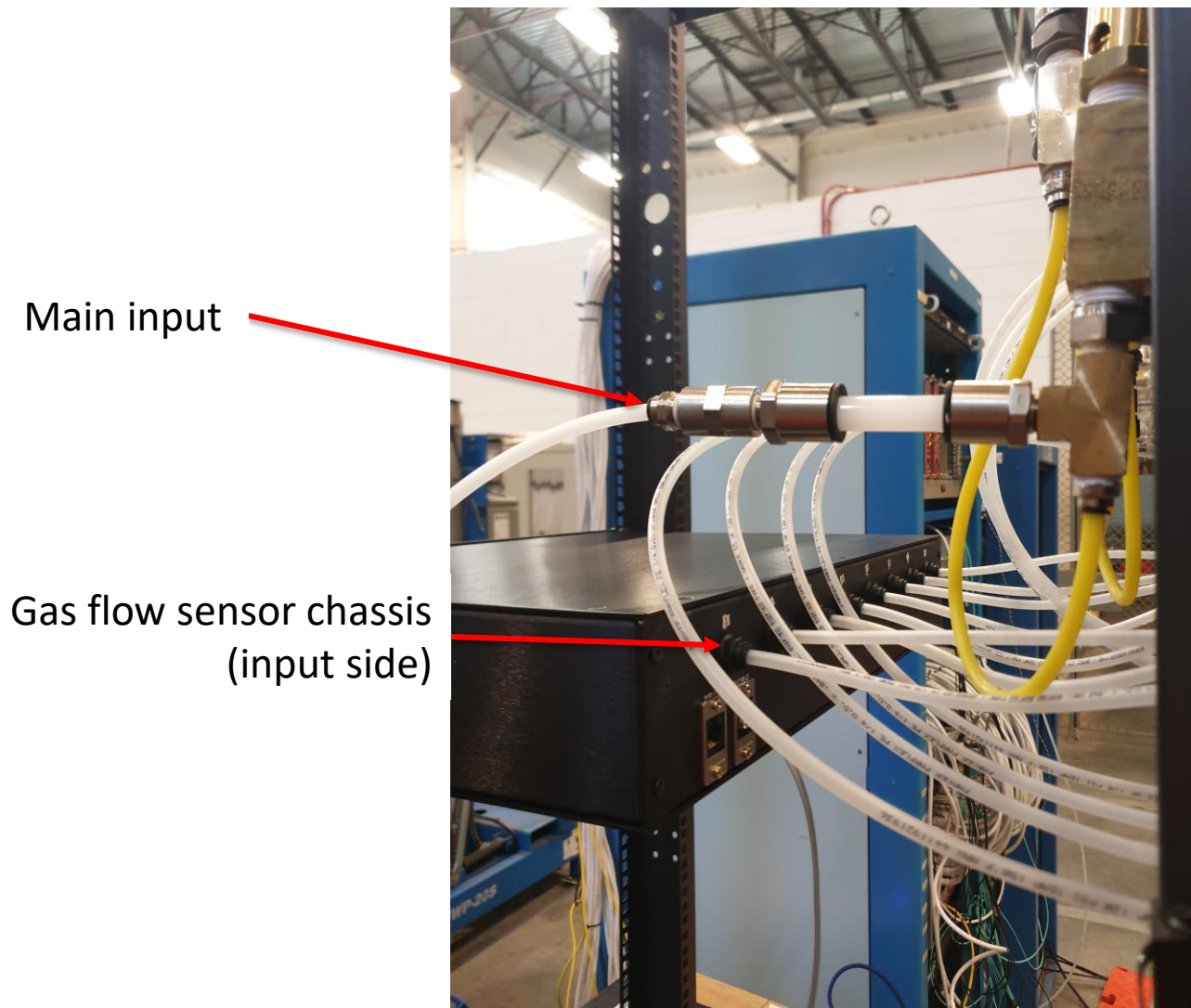


Input to pressure sensors

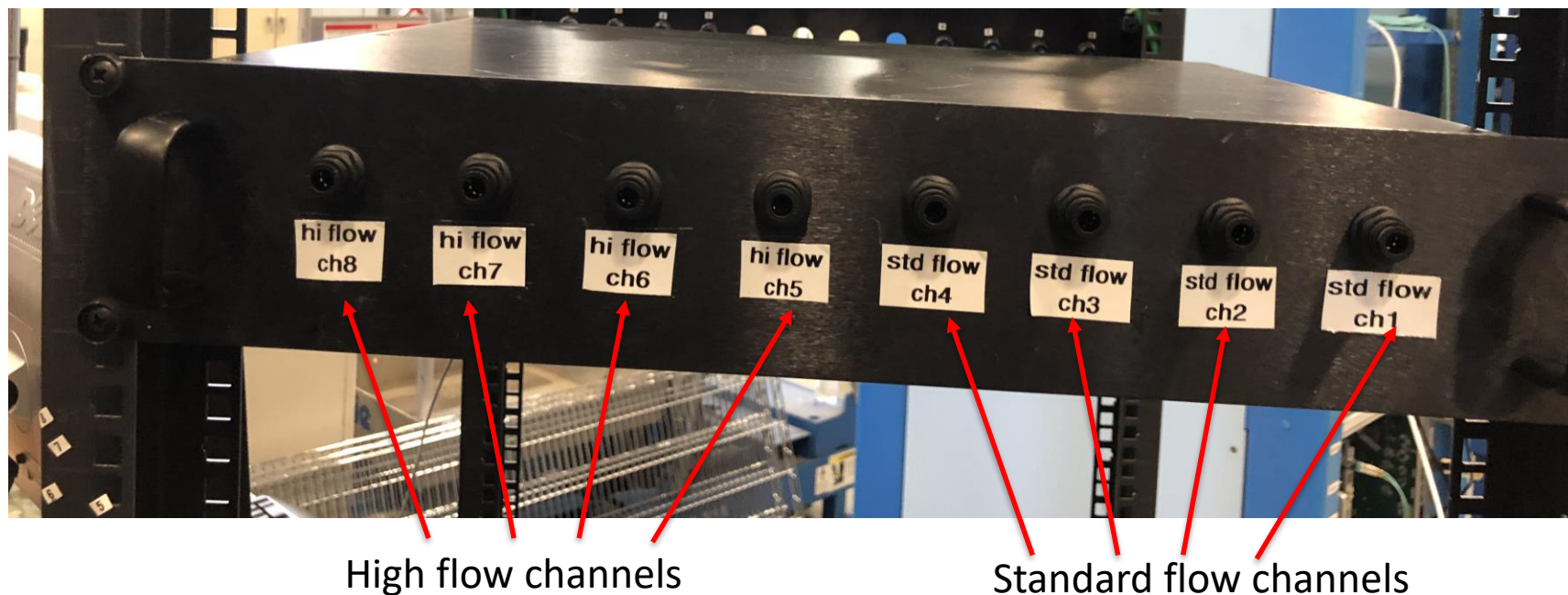
Flow meter outputs

Flow meter inputs

Rack Gas Line Connection: GFS Chassis Inputs

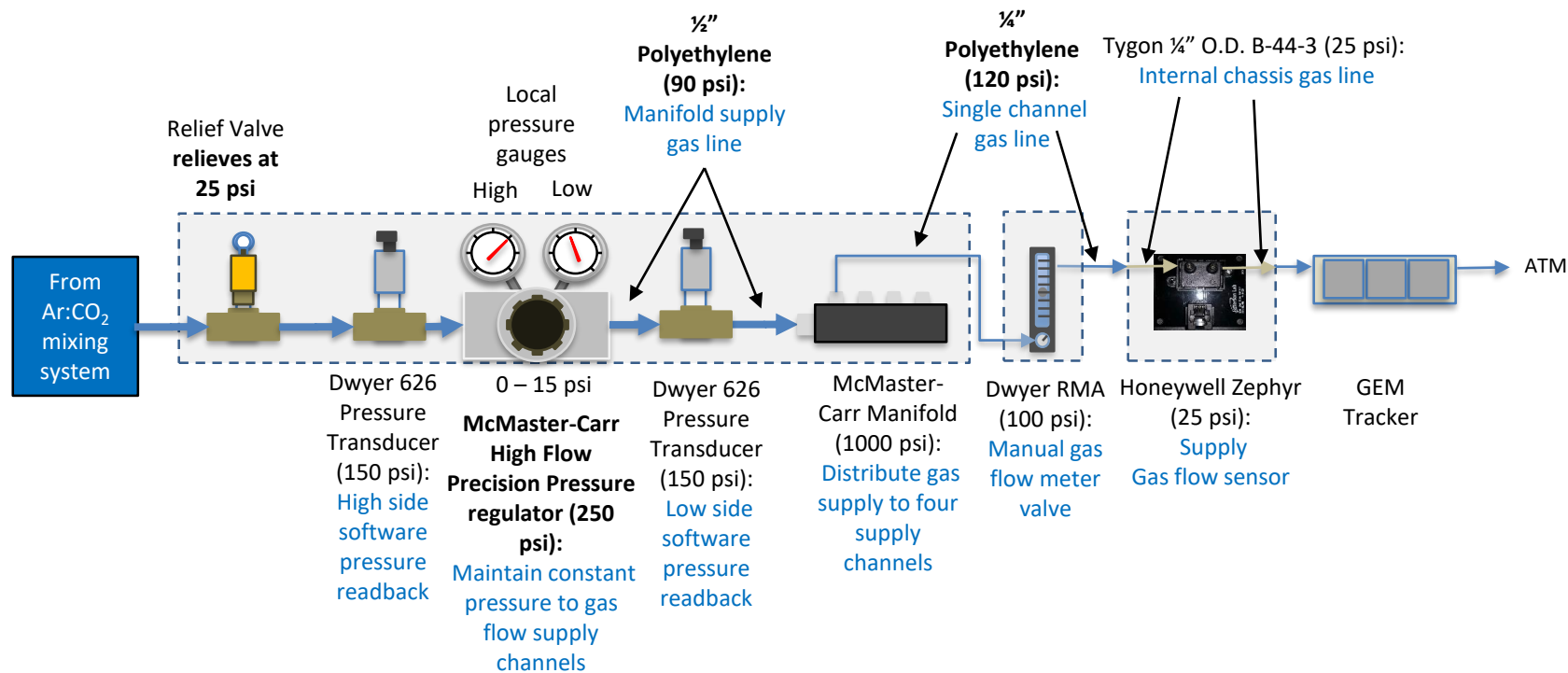


Rack Back: Gas Flow Sensor Chassis



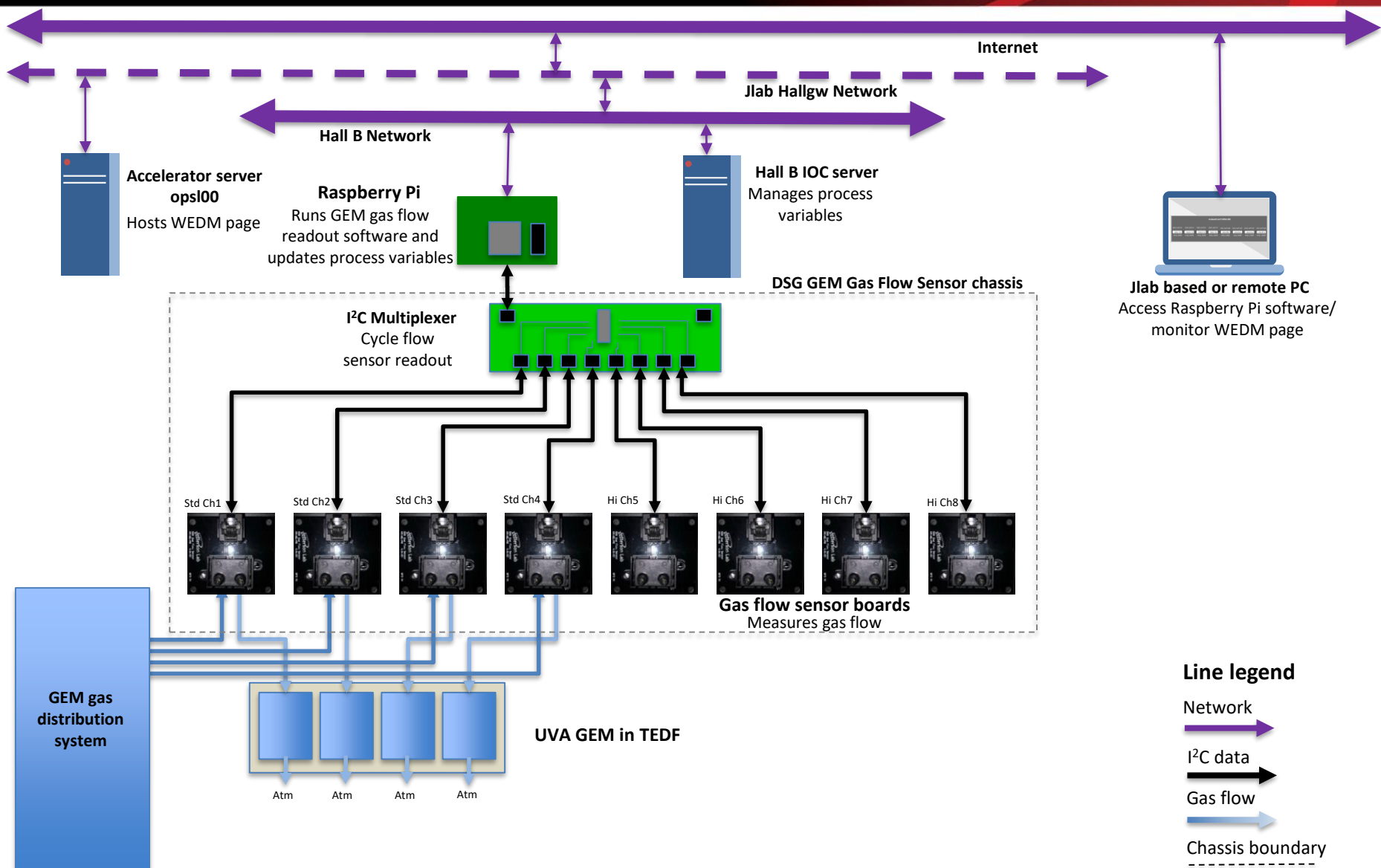
- Output to detector shown
- Input on rear panel

Single Channel Diagram



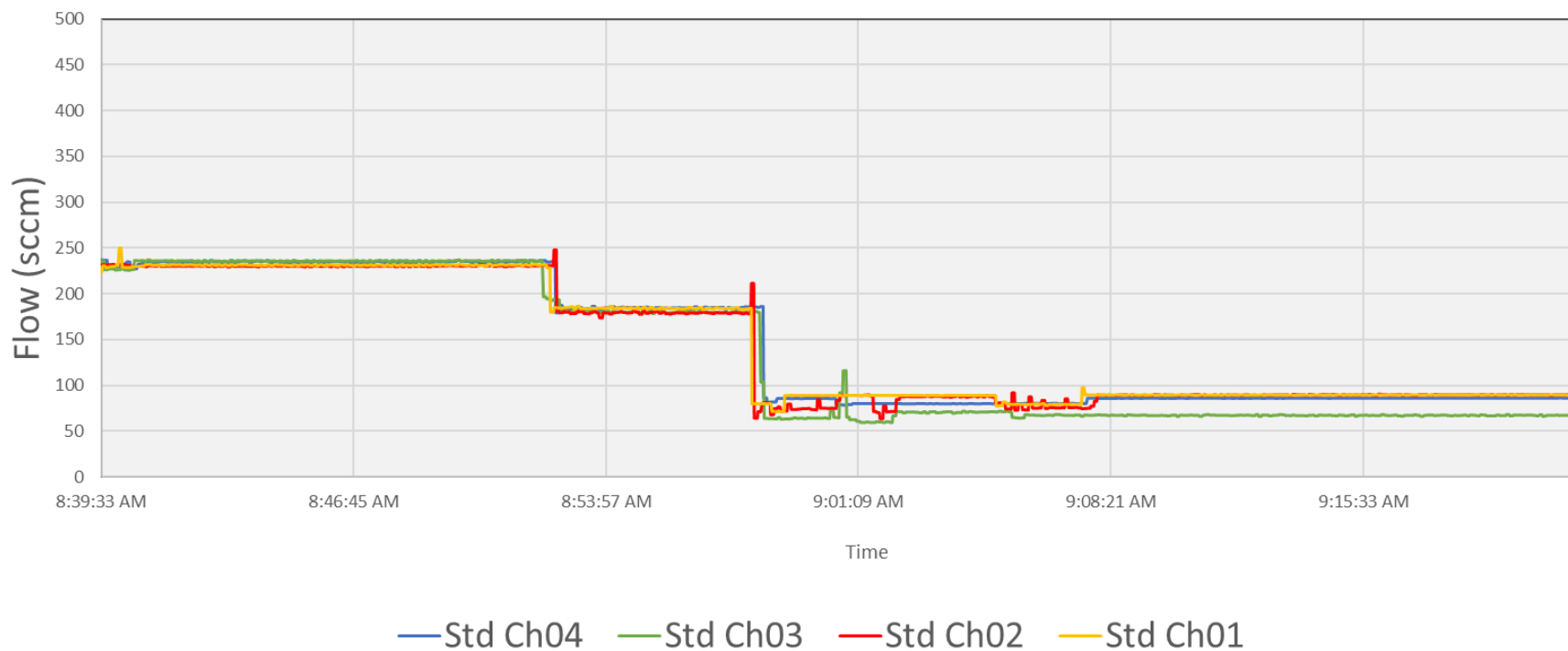
Schematic shows a single channel of gas supply/exhaust to a GEM detector

Data Flow Diagram



Remote Flow Monitoring

01/25/21 TEDF GEM gas flow



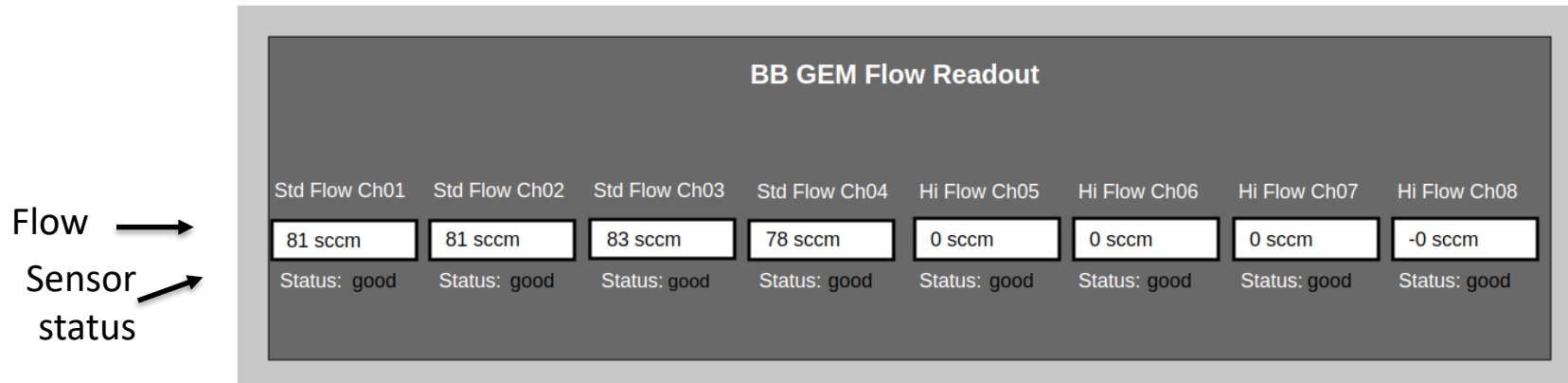
- DSG monitored flow transition from 235 sccm down to 80 sccm; channel 3 was set to 67 sccm

Issues

- During initial testing, the gas bottle depleted faster than expected
 - Determined that the leak was at the regulator panel
 - After troubleshooting the regulator, DSG determined that all three regulators leaked at the internal relief circuit
 - **DSG replaced with a regulator without an internal relief circuit and tested**
 - Fittings are listed as compatible with nylon and polyethylene tubing, however, during initial test, it was noted that polyethylene had better retention and did not leak
 - **DSG changed all gas lines to polyethylene**

Software Development

- DSG developed WEDM web-based monitoring



- DSG is developing regulator input and output pressure signals to add to remote monitoring capabilities

Conclusion

- Both issues of defective regulators and manufacturer misrepresentation of compatibility of gas line materials have been resolved by DSG and the prototype distribution system is performing as expected
- A WEDM webpage was developed and is being used to monitor the system by multiple users
- Advancements in remote monitoring of the regulator pressures and development of the exhaust readout system is moving forward

End

Thank You